

# INTEX-19 flight summary- August 13, 2004

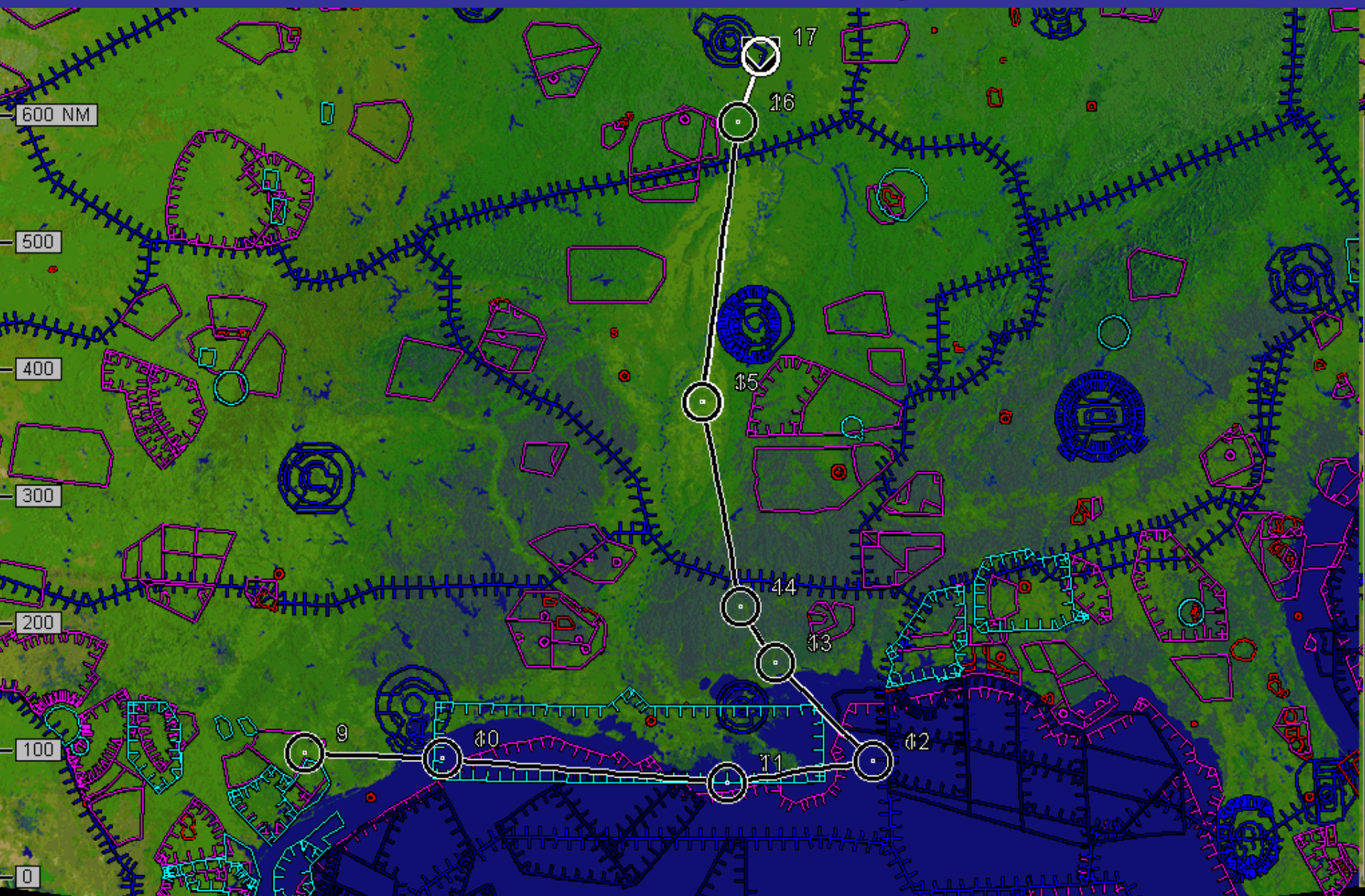
Primary objectives of this science flight from Mid America were Terra and aqua satellite validation and characterization of low level outflow over the Gulf of Mexico. It was expected that the northerly flow would allow a series of distinct urban/industrial plumes along the gulf coast to be characterized, so the west bound pass was flown at high altitude to create a DIAL curtain which could be used to target specific regions at low altitude on the return. Nominal take off time was 1400 UT with a total flight duration of 8.5 hours. The flight plan and flight profile is shown in the attached slides. A final aim was to return to Mid America close to on-schedule (2230 UT) to allow an on-time takeoff at 1530 UT on Saturday (Flight 20 ) for return to Dryden.

The major surface feature was a large high pressure center over the Midwest. This circulation brought unusually cold temperature to the area. East of the flight track, a stationary front was located along the East Coast, and Hurricane Charley was approaching the west coast of Florida. These systems produced northerly low-level winds over virtually all of the flight area. The only exception was southeast Texas where the winds had shifted to a more easterly direction. Low level winds over coastal Louisiana and Texas were rather strong, reaching 20-30 kt in some areas. The flow aloft was dominated by a major trough located just east of the Mississippi River and a strong ridge over the Rocky Mountain area. This combination provided westerly or northwesterly winds throughout the troposphere. The tropopause was relatively low over the northern portions of the flight track. There were relatively few clouds over the flight area. However, mid and low clouds did increase over the area during the afternoon due to surface heating.

The flight plan offered a good opportunity to take advantage of DIAL, since both the N-S and the E-W leg over the Gulf were repeated over the same ground track. Results were not quite as expected. During the south bound leg a persistent layer of elevated ozone, decreasing in altitude to the south, was observed in the DIAL images. Repeated attempts to place the DC-8 into this layer were only marginally successful. Speculation on board and the RAQMS forecast suggested this layer had stratospheric influence, however when we finally crossed through it on descent to set up the Terra spiral (1000 to 35,000 feet) over the gulf the peak ozone mixing ratio (115 ppb) appeared to be coincident with elevated CO (120 ppb). We did encounter this air on descent during landing, but were not able to linger for in-situ sampling. During the west bound high altitude leg to Texas, the DIAL images did not reveal any clear individual plumes, rather the whole track was characterized by an aerosol laden boundary layer with low to moderate levels of ozone. Therefore, the return was divided into a series of legs at 1000, 5000 and 8000 feet to characterize the vertical gradients in this polluted region. As suggested by DIAL, ozone was not notably enhanced in this low level air mass, but essentially all other gases and especially the aerosols were greatly elevated. During the upward spiral under AQUA, layers of enhanced ozone were noted at 10,000 and 17,000 feet. Altitude profiles of ozone, CO and the fast aerosol measurements all showed very good agreement between the upward and downward spirals. Both Terra and Aqua satellite underpasses occurred under virtually cloud free conditions. For the northbound leg we ascended to 5000 feet, intending to find the sloping ozone layer with DIAL and then climb to it. When it became apparent that the layer was no longer present we descended for one final 1000 foot run to characterize the continental boundary layer and then ascended to 37,000 feet to expedite return and allow DIAL to image nearly the full thickness of the troposphere over central US. As noted, enhanced ozone was observed in the mid troposphere as we approached Illinois, but the vertical distribution was markedly different than it had been in the morning.

The navigational data are available at URL: <http://www.dfrc.nasa.gov/Research/AirSci/DC-8/ICATS/index.html>

# Intex-NASA 817 13 Aug 04



# DC-8 NASA 817 INTER 13 Aug 04

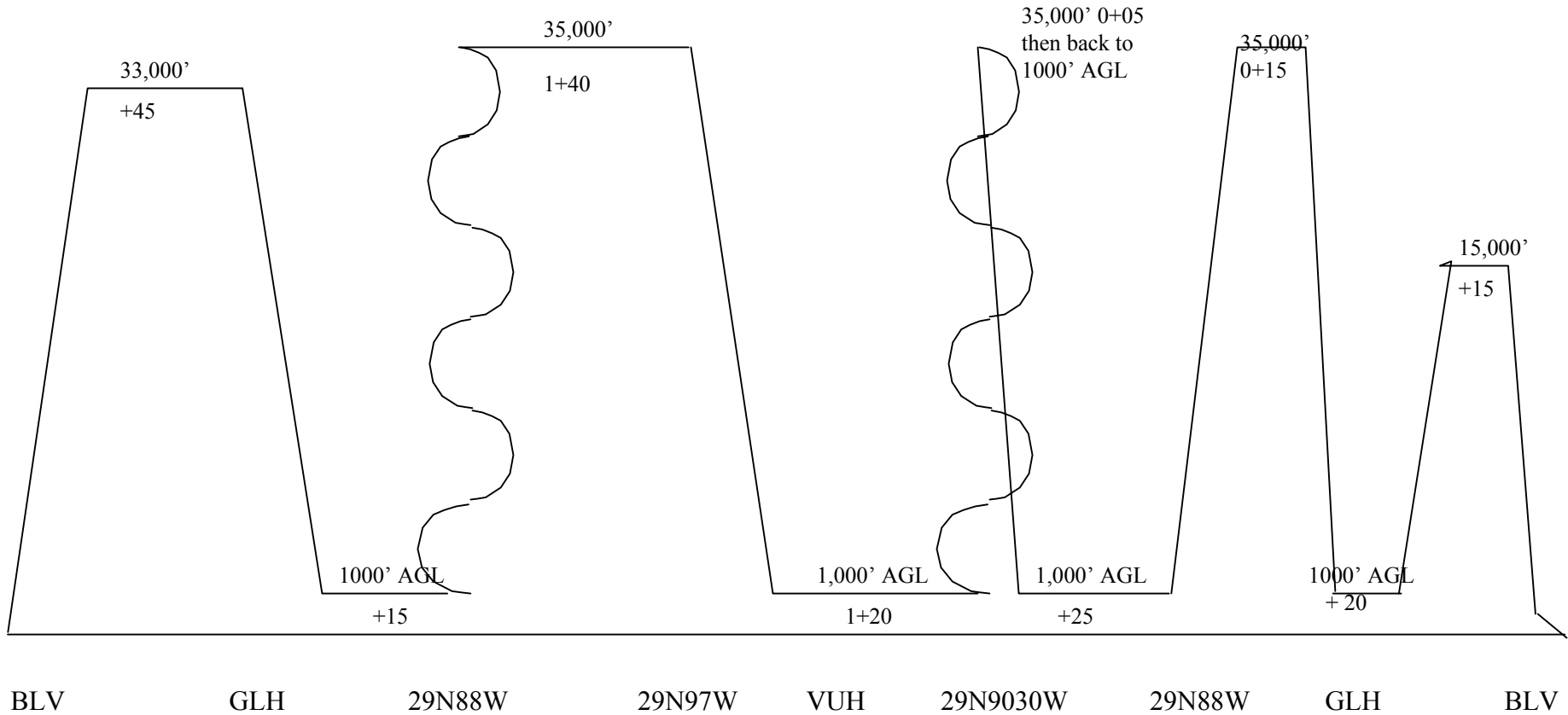
## SPIRAL CLIMBS

to 10,000 msl @1,000 fpm

then 1500 fpm

## ALL ENROUTE CLIMBS/DESCENTS

1500 FPM



TYPE ACFT DC-8		CALL SIGN NASA817	DATE	FROM SCOTT AFB MID N 38 32.7 W089 50.1	TO SCOTT AFB MID N 38 32.7 W089 50.1	PLND TO 13:50	ACT TO	PILOT		COPILOT		
TOT DIST 2130.5		TOT TIME 08+22	FUEL REQ 85855						NAVIGATOR		ENGINEER	
TP DTD#	Fix/Point Description	FREQ	Latitude Longitude	Alt Wind	TAS GS	TC MC	LEG DIST DIST REM	LEG TIME TIME REM	ETA	RETA	ATA	REMARKS
1	KBLV/A SCOTT AFB MID		N 38 32.7 W089 50.1	459M		136 137	0.0 2130	00+00 08+22	13:50			
2	FAM/R FARMINGTON	104X 115.70	N 37 40.4 W090 14.0	20000M	330 330	200 200	55.6 2075	00+10 08+12	14:00			
3	GLH/E009029 GREENVILLE	039X 110.20	N 34 00.1 W090 50.9	20000M	330 330	188 187	222.0 1853	00+40 07+32	14:41			
4	MCB/R MC COME	114X 116.70	N 31 18.3 W090 15.5	20000M	330 330	170 169	164.3 1689	00+30 07+02	15:11			
5	PCU/E PICAYUNE	059X 112.20	N 30 33.7 W089 43.8	20000M	330 330	149 148	52.2 1636	00+09 06+52	15:20			
6 SPT1	.29N 88W none		N 29 15.0 W088 15.0	20000M	330 330	135 136	110.1 1526	00+20 06+32	15:40			
	.delay		N 29 15.0 W088 15.0	20000M	330 330	135 136	0.0 1526	00+35 05+57	16:15			
7	LEV/R241023 LEEVILLE	082X 113.50	N 29 00.0 W090 30.0	20000M	330 330	263 263	119.2 1407	00+22 05+36	16:37			
8	VUH/R SCHOLES	077X 113.00	N 29 16.2 W094 52.1	20000M	330 330	274 272	230.1 1177	00+42 04+54	17:19			
9	.29N97W none		N 29 15.0 W097 00.0	20000M	330 330	269 265	111.9 1065	00+20 04+34	17:39			
10	VUH/R SCHOLES	077X 113.00	N 29 16.2 W094 52.1	20000M	330 330	089 085	111.9 953	00+20 04+13	17:59			
11 SPT2	LEV/R241023 LEEVILLE	082X 113.50	N 29 00.0 W090 30.0	20000M	330 330	094 092	230.1 723	00+42 03+31	18:41			
	.delay	082X 113.50	N 29 00.0 W090 30.0	20000M	330 330	094 093	0.0 723	01+15 02+16	19:56			
12	.29N88W none		N 29 15.0 W088 15.0	20000M	330 330	083 083	119.2 604	00+22 01+55	20:18			

TP DTD#	Fix/Point Description	FREQ	Latitude Longitude	Alt Wind	TAS GS	TC MC	LEG DIST DIST REM	LEG TIME TIME REM	ETA	RETA	ATA	REMARKS
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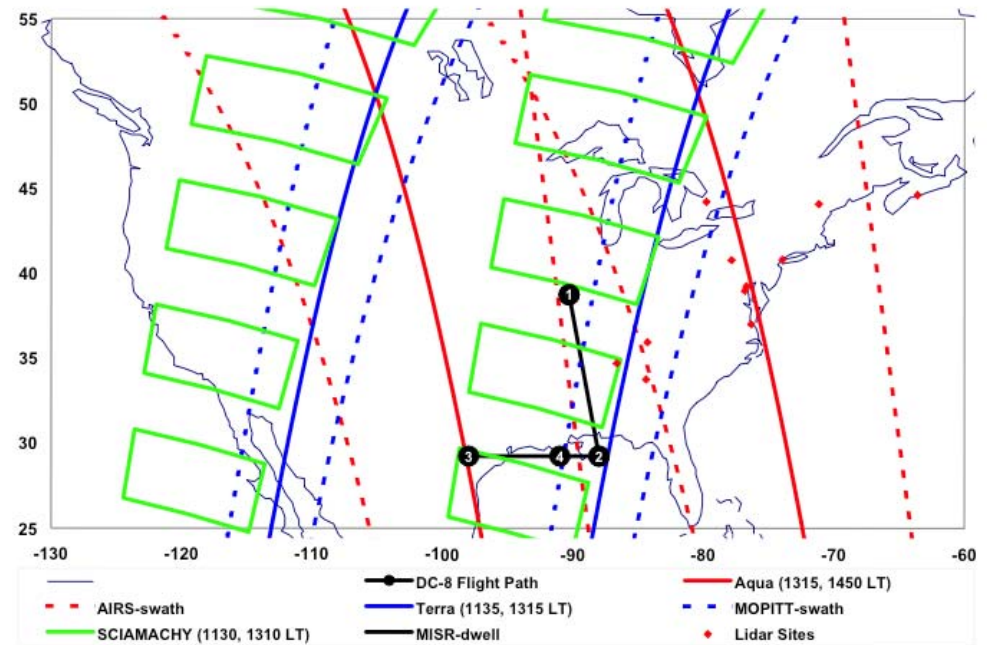


13	PCU/E PICAYUNE	059X 112.20	N 30 33.7 W089 43.8	20000M	330 330	315 316	110.1 494	00+20 01+35	20:38			
14	MCB/R MC COME	114X 116.70	N 31 18.3 W090 15.5	20000M	330 330	329 328	52.2 442	00+09 01+25	20:47			
15	GLH/E009029 GREENVILLE	039X 110.20	N 33 59.7 W090 51.1	20000M	330 330	349 349	163.9 278	00+30 +55	21:17			
16	FAM/R FARMINGTON	104X 115.70	N 37 40.4 W090 14.0	20000M	330 330	008 007	222.4 56	00+40 +15	21:57			
17	KBLV/A SCOTT AFB MID		N 38 32.7 W089 50.1	459M		020 020	55.6 0	00+15 +00	22:12			

# INTEX-19 flight plan- August 13, 2004

Take off time: 0915  
Flight duration: 8 h

Point	Latitude	Longitude	Flt Time	LT	UTC	Special instructions
1	38.75	-90.3	0:00	9:15	14:15	Estimated takeoff 9:15
2	29.25	-88	1:52	11:07	16:07	spiral under Terra satellite
3	29.25	-98	3:58	13:13	18:13	DIAL curtain
4	29.25	-91	5:08	14:23	19:23	1-15Kft, optional Aqua spiral
5	29.25	-88	6:04	15:19	20:19	1-15Kft
6	38.75	-90.3	7:56	17:11	22:11	



Objectives:

- satellite underpass
- Outflow from major industrial cities